

APPARATUS AND METHODS FOR PROCESSING SEMICONDUCTOR SUBSTRATES USING SUPERCRITICAL FLUIDS

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ABSTRACT OF THE DISCLOSURE

10 The present invention pertains to a system for cleaning wafers that includes specialized pressurization, process vessel, recirculation, chemical addition, depressurization, and recapture-recycle subsystems, as well as methods for implementing wafer cleaning using such a system. A solvent delivery mechanism converts a liquid-state sub-critical solution to a supercritical cleaning solution and introduces it into a process vessel that contains a wafer or wafers. The supercritical cleaning solution is recirculated through the process vessel by a recirculation system. An additive delivery system introduces chemical additives to the supercritical cleaning solution via the solvent delivery mechanism, the process vessel, or the recirculation system. Addition of chemical additives to the sub-critical solution may also be performed. The recirculation system provides efficient mixing of chemical additives, efficient cleaning, and process uniformity. A depressurization system provides dilution and removal of cleaning solutions under supercritical conditions. A recapture-recycle system introduces captured-purified solvents into the solvent delivery mechanism.